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SOUTHWEST FISHERIES CENTER

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HONOLULU LABORATORY
Honolulu, Hawaii

INSULAR RESOURCES INVESTIGATION

Freshwater Diversion Project Discussed

A workshop on a freshwater diversion project brought together scientists from the Honolulu Laboratory (Richard S. Shomura, Drs. Boehlert, Robert A. Skillman, David A. Somerton, and Jerry A. Wetherall), representatives from the University of Hawaii, Western Pacific Program Office, the U.S. Navy, and various Hawaii State resource management agencies (Division of Aquatic Resources and Division of Water and Land Development). The proposed project would take place in West Loch, Pearl Harbor.

In this diversion project, which was described in detail by Dr. Y. Fok of the University of Hawaii, freshwater would be captured either within Waikele Stream using some type of culvert, or within West Loch itself using an impermeable membrane as a dam to impound the water. In either situation, up to two-thirds of the total freshwater input to West Loch could be diverted. The participants discussed the potential impacts of such a project on the nehu, Stolephorus purpureus, stock within Pearl Harbor.

Skillman, who facilitated the meeting, elicited responses from the participants to the question: What individual projects and activities will be needed to determine the potential effects of freshwater diversion and habitat loss on the biota in Pearl Harbor? The participants discussed and identified 21 distinct research activities as sufficiently important to warrant further consideration. A list of these activities was then sent to each of the participants with the request that five be chosen and ranked according to their importance. The priority consensus will be used by staff at the Honolulu Laboratory to help define the direction and scope of future research on the potential effects of freshwater diversion on the Pearl Harbor stock of nehu. (G.W. Boehlert, FTS (808) 943-1221)

Artificial Reef Modules Deployed

Nine artificial reef modules were deployed on Penguin Bank off the Island of Molokai in October, as part of a study to determine if artificial reefs can create new fishing grounds there. One of the modules is constructed of fiberglass reinforced plastic, weighs 13 tons, and has an enclosed volume of 107.5 m^3 (3,800 ft^3). This module was placed at 130 m to provide habitat for snappers and jacks. The other eight modules were

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made from concrete pipes of 0.3 and 0.6 m (1 and 1.5 ft) diameter assembled in bundles of three and six pipes. These modules were deployed in two groups of four at depths of 50 and 100 m to provide habitat primarily for spiny lobsters. One day after deployment, the reefs were observed from the Hawaii Undersea Research Laboratory submersible Makali'i. The reef modules suffered no structural damage due to the deployment and already had attracted small populations of commercially important fishes including uku, Aprion virescens, ulua, Caranx ignobilis, kahala, Seriola dumerili, and a deepwater surgeonfish, Naso hexacanthus. The reefs will be censused periodically with the submersible and fished experimentally to determine the kind of marine community which develops in the reefs. (J.J. Polovina, FTS (808) 943-1221)

Lobster Catch Rates Compared

As part of an on-going effort to monitor the Northwestern Hawaiian Islands lobstery fishery, Dr. Jeffrey Polovina and Robert B. Moffitt, Fishery Biologist, have compared the catch rates of spiny lobster, Panulirus marginatus, and slipper lobsters, Scyllarides squammosus and S. haanii, at Necker Island, Laysan Island, and Maro Reef. The catch rates were obtained during research cruises conducted in 1977 and 1985. For both years the same type of traps were used and identical geographic sites were fished. In 1985 the catch rates, measured as the total number of lobsters per trap night, were 40% of their 1977 level at Necker Island, 60% of their 1977 level at Maro Reef, and essentially unchanged at Laysan Island which is a refuge and is closed to lobster trapping. Polovina and Moffitt estimated that current fishing mortality is 1.5 times greater than natural mortality at Necker Island and 0.5 times greater than natural mortality at Maro Reef. Although commercial landings of slipper lobsters have increased dramatically since the fishery began in 1976-77, the standardized sampling indicates that this trend is primarily due to changes in (1) the design of the gear, which has resulted in greater catchability of slipper lobsters, and (2) fishing practices, which target slipper lobster habitat. The increase is not due to any biological succession triggered by heavy fishing pressure on spiny lobsters as was once suggested. (J.J. Polovina, FTS (808) 943-1221)

Visiting Scientist Receives Training at the Honolulu Laboratory

Augustine Mobiha, Department of Primary Industry, Fisheries Research Division, Papua New Guinea, is working with staff of the Insular Stock-Assessment Program for a month. Mobiha is studying a method for ageing tropical fishes, which was developed by Dr. Stephen Ralston at the Honolulu Laboratory. In this method, the relationship between the width of daily otolith increments and otolith size is determined, and these data are then integrated to provide estimates of age. Mobiha brought his own otolith material to work with and has been preparing and examining thin sections from Lethrinus semicinctus and Lutjanus bohar under the guidance of research assistant Happy A. Williams. When he returns to Kavieng, Papua New Guinea, Mobiha intends to set up a laboratory in which fish will be routinely aged. (S. Ralston, FTS (808) 943-1221)

FISHERY MANAGEMENT RESEARCH PROGRAM

Report on Spiny Lobster Fishery Prepared

Monthly reports of catch, effort, and catch per unit of effort in the Northwestern Hawaiian Islands lobster fishery were prepared by research assistant Raymond P. Clarke, and Joan P. Thomason, Computer Programmer of the Fishery Management Research Program. The reports were prepared for the Southwest Region and the Western Pacific Regional Fishery Management Council.

Four vessels made landings in September 1985 which was average for the year; however, twice as many boats made landings from October 1984 to September 1985 than from October 1983 to September 1984. There also were nearly twice as many trips. In July 1985, landings of legal spiny lobster returned to being greater than slipper lobster landings, and this situation continued through September. The catch of legal spiny lobster (76,563) is more than twice that in 1984, and the catch of slipper lobster is somewhat higher. The catch per trap-night for legal spiny lobster in September is the largest recorded in 1985, whereas the catch for slipper lobster is slightly larger than the low recorded in January 1985. The 1985 catch rate for spiny lobster (118,922) is still well below that in September 1984, as is the cumulative catch rate through September. For slipper lobster, the catch rate in September 1985 (18,131) was much lower than that in 1984, but the cumulative catch rate through September 1985 is well above the 1984 figure.

Maro Reef continues to be the most important fishing ground for spiny and slipper lobsters, but St. Rogatien Bank has replaced Necker Island as the second most important fishing ground. The catches of legal spiny lobster on Necker have fallen considerably from previous years. (R. A. Skillman, FTS (808) 943-1221)

Plans Nearly Complete for Field Escape Vent Experiments

Preparations are nearly complete for carrying out the field phase of the escape vent experiments on spiny lobster traps to improve retention of slipper lobsters, and at the same time maintain the effectiveness of the escape vents in retaining spiny lobsters. Research assistant Alan R. Everson has completed laboratory trials on escapement of lobster and alternative locations of the escape vents in the traps used by the commercial lobster fleet. Placement of the two escape vents in the upper edges resulted in less escapement of slipper lobster than for vents located just off the bottom of the trap, halfway up the sides, or on the top. Escapement of spiny lobster seems to be unaffected. Reducing the vent height to 51 mm from the original 55 mm resulted in retention of legal spiny lobster 4.8 mm, the new proposed minimum size.

Results from the trials with the smaller vent height can be added to the results from last year's trials to compute a new response surface equation that can be used to estimate the optimum vent size for the range

mm located in the upper corners of the traps will be used on the upcoming Townsend Cromwell cruise to Necker Island and Maro Reef in November 1985. (R.A. Skillman, FTS (808) 943-1221)

Cost-Earnings Simulator Developed

Samuel G. Pooley, Industry Economist, has developed a simple cost-earnings simulator using a spreadsheet software on the Program's multi-user microcomputer. The simulator is based on an "income statement" of basic costs and a "vessel operations" account of operating patterns, catches, prices, etc. The simulators allow calculation of the sensitivity of vessel revenue to various cost, revenue, and operating parameters. Data on two classes of bottom handline vessels and preliminary data for spiny lobster vessels have been incorporated into the simulators for testing purposes. (S.G. Pooley, FTS (808) 943-1221)

Long-Term Temperature and Salinity Data Analyzed

Gary L. Kamer, Statistician, and Dr. Robert A. Skillman, Leader of the Fishery Management Research Program, completed an analysis of the temperature and salinity data from the Koko Head, Oahu, sampling station using the harmonic or spectral time series analysis technique. The data covered 29 years. Only the annual cycle seems to have any significant effect in the temperature series, although there is a long-term linear trend with positive slope. For the salinity time series, the annual cycle and a number of longer-term cycles (3-1/2 and 7 years) are important. There is also a statistically significant, long-term linear trend with positive slope. (R.A. Skillman, FTS (808) 943-1221)

American Samoa Data Management System Upgraded

David C. Hamm, Computer Systems Analyst, traveled to American Samoa to work with personnel at the Office of Marine Resources (OMR) in American Samoa on the Western Pacific Fishery Information Network (WPACFIN). The OMR has modified its commercial fishery sampling program into separate inshore and offshore creel survey systems similar to those of Guam and the Commonwealth of the Northern Mariana Islands. The staff of the OMR is using a modification of a data expansion system developed earlier, and thus will be better able to estimate total harvest of their inshore and offshore resources. The OMR is also designing and implementing a commercial "trip ticket" system. While at OMR, Hamm helped design a form that will be distributed to all purchasers of fresh fishery products including stores, restaurants, and the hotel. (D.C. Hamm, FTS (808) 943-1221)

PELAGIC RESOURCES INVESTIGATION

Physiological Reactions of Tunas to Lowered Oxygen Conditions Studied

Fishery biologist Peter G. Bushnell, and research assistant Robert E. Bourke conducted experiments this month quantifying the physiological responses of eight skipjack tuna, Katsuwonus pelamis, to lowered ambient oxygen conditions. The objective of these experiments is to provide quantitative information on the effect of varied ambient oxygen levels on the distribution, abundance, gear vulnerability and natural mortality of skipjack tuna and yellowfin tuna, Thunnus albacares.

During the experiments, oxygen, carbon dioxide, and pH of arterial blood, heart rate, cardiac output, ventilation volume, blood pressure, and mouth gape are measured simultaneously. The skipjack tuna showed significantly lowered heart rates, increased mouth gape and increased ventilation volume when the water oxygen level was reduced by one-third from full oxygen saturation. Similar reactions have been observed in yellowfin tuna that were tested under the same conditions. Skipjack tuna, however, were found to be much more sensitive than yellowfin tuna to reduced water flow over the gills, although the physiological reactions were similar to those observed under reduced water oxygen levels. (R.W. Brill, FTS (808) 943-1221)

Intra-Vascular Parasite Disappears from Hawaiian Yellowfin Tuna

Robert E. Bourke reports that during the past 2 months he has examined the dorsal aorta of over 50 small (1-3 kg) yellowfin tuna and found not one that was infested with larval cestode parasites. Over the past 2 years, the infestation rate in small yellowfin tuna caught near Hawaii had been approximately 50%; the reasons for the apparent sudden disappearance of the parasite are unknown. Studies on the effect of the parasite on the growth rate of yellowfin tuna and the ability of yellowfin tuna to rid themselves of the parasite once infested are currently suspended until more infested fish can be obtained.

DATA MANAGEMENT AND TECHNICAL SERVICES

Additional Personal Computers Purchased

Fletcher V. Riggs, Chief, Data Management and Technical Services, reported that six IBM PC/AT's have been purchased and are operating at the Honolulu Laboratory. Word-processing, language, and statistical software and peripheral devices (an Epson FX-185 printer is directly connected to each PC/AT and a Hewlett-Packard 7475A plotter is connected to a PC/AT in the computer room) are available for the new equipment. The PC/AT's are "enhanced" models which have 512K RAM, a 20-megabyte hard disk, one high

density floppy drive, an Enhanced Graphics Adapter, and an Enhanced Color Monitor. Additional memory is being purchased to accommodate some software (for example, BMD-PC requires 640K RAM)

The use of the AT's will probably reduce the Laboratory's dependence on the University of Hawaii's IBM 3081, especially once SAS-PC becomes available. Use of the AT's will also help to solve space limitation problems on the multi-user Molecular computer and provide graphics display capabilities.

File transfer is already available over direct lines between the PC/AT's (PC-DOS) and the Molecular system (CP/M) using Kermit and Crosstalk. However, flexibility in intersystem communication will increase significantly in the near future when all data processing systems (Molecular, CompuPro, IBM PC/AT's UH IBM 3081) and peripherals (terminals, modems) used by the Honolulu Laboratory are connected to the recently acquired Develcon switch (port selector). (F.V. Riggs, FTS (808) 943-1221)

COASTAL FISHERIES RESOURCES DIVISION
La Jolla, California

SURVEY SYSTEMS DEVELOPMENT AND EVALUATION

Pacific Sardine Begins Comeback off California

The Pacific sardine whose dramatic decline in the late 1940's sparked a multi-million dollar scientific investigation is making a comeback, according to marine biologists Patricia Wolf of the California Department of Fish and Game and Paul E. Smith, Coastal Fisheries Resources Division.

First noted in the Pacific Northwest, a severe decline in sardine landings began during the 1945-46 season and moved progressively southward. A low was reached when the 1953-54 sardine season in California yielded only 4,500 tons of sardines. Sardines, a standard food item, packed in the familiar oval cans in mustard or tomato sauce virtually disappeared from American food market shelves.

In an attempt to understand the causes of this decline in sardine numbers, fishery biologists and oceanographers from the California Department of Fish and Game, National Marine Fisheries Service, and the Scripps Institution of Oceanography organized under the umbrella of the California Cooperative Oceanic Fisheries Investigations (CalCOFI) to begin the most intensive study ever undertaken of any marine fish found in U.S. coastal waters. Although fishery biologists everywhere have not agreed on the reasons for the precipitous decline in the sardine landings, most believe that the prolonged heavy fishing which occurred from 1928-29 through 1945-46, combined with unfavorable environmental changes, resulted in the spectacular failure of the sardine fishery in California.

Acting on the advice of fishery biologists who advocated a complete ban on sardine fishing to permit the sardine resource to recover from extremely low levels, California legislators voted in 1974 to prohibit sardine fishing in 1974. A feature of this law also provided for a 1,000 ton annual fishery when the California Department of Fish and Game determined that the population of adult sardines had reached 20,000 tons.

Signs of an encouraging increase appeared as early as 1981 as sardines occurred in ever greater numbers in the incidental catch of mackerel and live bait fisheries, in aerial spotter observations, in annual California Department of Fish and Game sea surveys and, increasingly, as larvae in plankton collections made by the National Marine Fisheries Service during biological surveys.

Because the population level of the Pacific sardine is too low to be estimated reliably by existing techniques, Wolf and Smith designed a new survey system to estimate whether the adult sardine population is above or below 20,000 tons, the number which would signal the beginning of a commercial fishery. Their approach was based on the egg production method developed earlier by NMFS scientists at the Southwest Fisheries Center. As

a first step, Wolf and Smith calculated the minimum geographic area which they estimated encompassed a spawning population of 20,000 tons of adult sardines. The location and extent of the survey area, and the time of year of the survey were determined from the historical record of occurrences of sardine eggs and larvae found in the plankton samples during those times in past years when the sardine biomass levels were estimated to be near 20,000 tons.

In May 1985 Wolf and Smith employed their new method off southern California over the total survey area. They found 11 biological stations positive for sardine eggs in a total spawning area of 710 square nautical miles, indicating a very high probability that there were at least 20,000 tons of spawning biomass of sardines present off California.

The results of the survey were presented to the California Department of Fish and Game who now plan to open a 1,000 ton limited sardine fishery beginning January 1, 1986. According to California law, the sardines caught may be used either as human or animal food or for reduction to fish meal.

The Pacific sardine story, famous in the annals of both literature and biology, may now turn out to have a new beginning. This small fish, once hunted at night during the dark of the moon along the Pacific Coast from southern Baja California and into the Gulf of California, appears to be making a modest comeback. With a bit of luck, fishery biologists believe that the distinctive luminescent fireballs produced as the dense sardine schools move through the surface layers of the sea will once again be a nighttime sight off the California coast. (P. Smith, FTS 893-6346)

COMMERCIAL AND RECREATIONAL FISHERY RESEARCH FOR MANAGEMENT

Anchovy Age Composition Estimated

Dr. Richard Methot, Fishery Biologist, has completed an examination of estimated age composition of anchovies from trawl surveys conducted by the National Marine Fisheries Service and California Department of Fish and Game. Accurate monitoring of the northern anchovy stock requires estimates of biomass for detecting trends in abundance, and estimates of age composition for detecting short-term perturbations in abundance. Since 1980 the NMFS has estimated anchovy biomass by the egg production method. CDFG has estimated age composition through monitoring the fishery and midwater trawl surveys.

Samples of adult anchovy collected by trawl are necessary for the egg production model. In 1985 the egg production trawl collections were subsampled to obtain additional specimens for determining the stock's age composition. These 41 samples are especially useful because the NMFS survey covered an area larger than the area covered by the CDFG survey. Age determinations for the NMFS samples were made by CDFG personnel.

The results obtained by the NMFS trawl survey were essentially identical to those obtained by the CDFG trawl survey:

	YEAR CLASS					
	84	83	82	81	80	N Fish
Entire NMFS survey	.690	.195	.105	.005	.005	410
Pt. Conception to Border:						
NMFS	.678	.203	.106	.006	.006	320
CDFG	.668	.224	.092	.009	.007	567

Partitioning the NMFS survey into four regions (North, South, Inshore and Offshore) revealed very little spatial variation in age composition. The relatively high abundance of the youngest year class is consistent with the increased abundance observed in winter 1985. Routine subsampling of NMFS egg production trawl collections for age composition will improve monitoring of the anchovy stock, make efficient use of scarce and expensive shiptime, and enable studies of age-specific spawning rates. (R. Methot, FTS 893-6225)

Progress on Bay Area Sportfish Economics Survey

Cynthia Thomson, Economist, reports that CIC Research Inc. of San Diego has begun collecting data from recreational anglers residing in the San Francisco Bay area. CIC uses the telephone survey portion of the Marine Recreational Fishing Statistics Survey to select a random sample of fishing households. Questionnaires will be sent out during six two-month survey periods beginning in August 1985 and ending in June 1986. Thus far, 389 of the 745 questionnaires mailed in the first survey have been returned.

The data from the Bay Area Sportfish Economics Survey will be used to estimate the economic values associated with recreational fishing in the San Francisco Bay area. Thomson and Dan Huppert, Economist, who are monitoring the contract, have received a tape containing data from this first survey and a status report on the sampling effort. Thomson will use these data to perform some preliminary analyses and the entire data set, once received, to estimate a demand model for recreational fishing. (C. Thomson, FTS 893-6209)

Pacific Mackerel Recruitment Studied

A biostatistical study of biological, environmental, and contaminant effects on fish stocks is underway. Dr. Michael Prager, Operations Research Analyst, and Dr. Alec MacCall, Fishery Biologist, will examine the pelagic fish stocks of the Southern California Bight in this study. They presented a paper describing the first part of their work at the recent CalCOFI meeting in Idylwild, California.

The historical data on Pacific mackerel stock and recruitment are being studied first, in part to develop methodology for the project.

Because most of the variability in fish population dynamics is present by the time of recruitment, stock and recruitment models will form the statistical basis of the work. Existing recruitment models, for example the widely used Ricker model, consider only stock size and density effects, and do not explain most of the variability seen in nature. To improve on such models, several workers have added environmental influences to standard models of recruitment dynamics. The current study will build on such work by partitioning the causes of recruitment variability into three areas: stock density, natural environmental influences, and contaminant effects.

MacCall and Prager used simulation modeling to examine the relationship between stock density and environmental influences. First, they fit a Ricker stock-recruitment model to the Pacific mackerel data series. This model assumes that high stock densities will result in reduced spawning success; this assumption is reflected in the nonlinearity of the fitted curve (Figure 1). Next, they generated simulated data containing no explicit stock density effects. These data were, however, given the same autocorrelation structure found in the real mackerel data. This autocorrelation structure is probably largely due to the cyclical nature of climatic and physical oceanographic variations, such as El Niño events. The simulated data are shown with a fitted Ricker model in Figure 2.

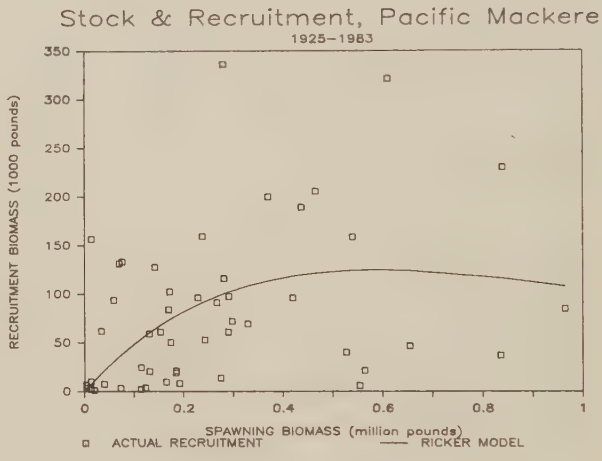


Figure 1

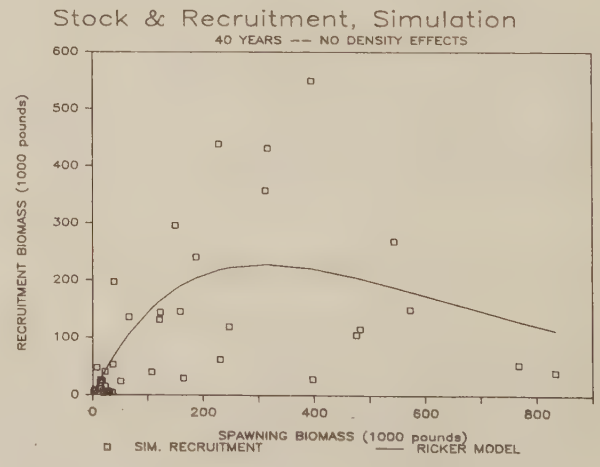


Figure 2

The appearance of density dependence in the simulated data is striking, and perhaps more noticeable than in the real data. However, the simulated data were generated with no density dependence. The appearance seems to be caused by confounding between the life span of the Pacific mackerel (5-6 years) and the dominant frequencies of variation in the environment (4-6 years). The implication is that it may be very difficult, from the data alone, to separate density dependent effects on recruitment from those caused by environmental variation. (M. Prager, FTS 893-6272)

OCEANIC FISHERIES RESOURCES DIVISION
La Jolla, California

SENIOR SCIENTIST

SWFC Scientist Visits Marine Mammal Research Laboratories in China

Senior scientist William F. Perrin visited research laboratories in Beijing, Wuhan, Nanjing and Taipei during a 3-week trip to the People's Republic of China and the Republic of China (Taiwan) in October. He was accompanied by his wife Christina H. Perrin, also of the SWFC. The portion of his trip in the PRC was funded by the Academia Sinica (Chinese Academy of Science).

In Beijing Perrin visited two laboratories of the Institute of Biophysics and reviewed research on the ultrastructure and functional anatomy of the skin, eyes and ears of dolphins by Drs. Wu Qijiu and Feng Wenhui. In Wuhan he visited the dolphin research laboratory at the Institute of Hydrobiology. The group of 13 scientists and technicians there is headed by Chen Peixun, who is responsible for research on the highly endangered baiji (Lipotes vexillifer)(Figure 1) and the finless porpoise (Neophocaena phocaenoides). The dolphin facility consists of two large holding tanks, fish culture ponds, and a two-story laboratory building. In its field work, the laboratory uses chartered vessels, and a small research vessel which belongs to the Institute. The staff includes specialists in ecology, anatomy, behavior, acoustics, hematology, and veterinary medicine as well as several laboratory technicians, a graduate student (in bioacoustics) and a dolphin keeper. At present there is one baiji at the facility, a male that has been in captivity for six years. Plans are to capture a female and attempt captive breeding of the species. Plans for construction of a larger and more modern dolphinarium at the site are in review at Academia Sinica.

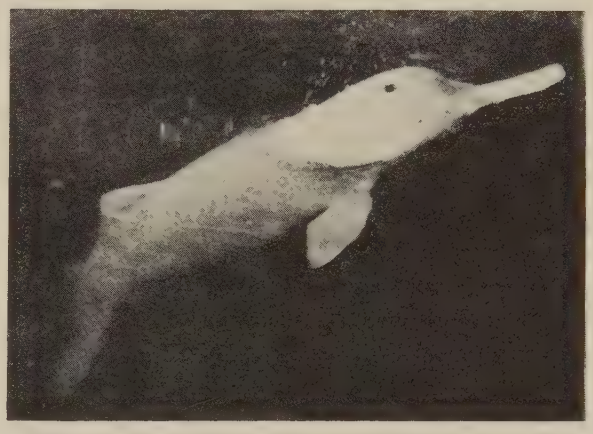


Figure 1. A baiji or Yangtze River dolphin.

Perrin gave four lectures at Wuhan: "Dolphin taxonomy," "The dolphin/tuna problem," "Conservation and management of marine mammals in the United States" and "Estimating dolphin abundance." The lectures were translated by C. Perrin, who was born in China. They also took part in long discussion sessions reviewing the results and direction of the laboratory's research on Lipotes. The remaining population of Lipotes is small (probably in the low hundreds) and is probably declining rapidly because of incidental capture in a snag-hook sturgeon fishery (Figure 2) and collisions with large and small vessels on the increasingly congested Chang Jiang (Yangtze River).

Figure 2. Snagfishery for sturgeon endangers the Yangtze River dolphin.

Efforts of the Wuhan group are directed mainly at population assessment and the development of ways to keep the species from becoming extinct. Plans are to carry out more work with captive animals to study basic life history, behavior, and physiology; to refine the estimate of abundance and better delineate the habitat and ecological requirements of the species; to develop plans for creating refuges in the present areas of highest abundance (with restrictions on fishing and boat traffic); and, most ambitiously, to block off a 21-km oxbow of the river and translocate a number of baiji there for breeding and study in semi-captivity. Given the difficulty of enforcing protective measures on the open river, the last is thought to be the best chance to perpetuate the species. Perrin reviewed these plans and recommended: 1) de-emphasis of present efforts to improve precision of population estimates and development of a reliable relative index of abundance to monitor the course of the population, 2) development of a method to catalog the individual dolphins, to allow alternative estimation of population size and monitoring of reproduction and movements, and 3) attempts to condition the wild dolphins in one area (perhaps Hung Hu) to allow the researchers to work more closely with them (they presently avoid the research vessel and are only observed fleetingly), to facilitate cataloging, monitoring of reproduction and mortality, acoustic studies, ethological studies and perhaps to simplify later captures for translocation. Perrin agreed to arrange and mediate consultations with specialists in the U.S. and other countries to develop the research plans for Wuhan for the next several years.

While in Wahun, Perrin also met with Chen, Liu Renjun, scientists in the dolphin research laboratory, and Professor Liu Jiankang, Director of the Institute of Hydrobiology, to work on plans for a workshop on the biology and conservation of the platanistoid dolphins (the baiji in China, the susu in India, Pakistan, Bangladesh and Nepal, the boutu in Brazil, Venezuela and Peru, and the franciscana in Uruguay and Argentina). The workshop will be held next October in Wuhan and will be organized by the Institute of Hydrobiology, the dolphin group at Nanjing Normal University

and the Cetacean Specialist Group (CSG) of the International Union for the Conservation of Nature and Natural Resources' (IUCN) Species Survival Commission (Perrin is chairman of the CSG). Funding for the workshop will probably be provided by the United Nations Environmental Program (UNEP).

Following three days of lectures and discussions at Wuhan, Perrin spent three days on the river on the Institute's research vessel, observing the baiji and the finless porpoise and visiting one of the proposed refuge sites.

Perrin next traveled by passenger vessel to Nanjing, where he visited the dolphin research laboratory headed by Zhou Kaiya. The Nanjing group also has plans for a semi-captive reserve (at a different locality), and Perrin gave Zhou copies of reviews of the Nanjing proposal that he had solicited from dolphin-husbandry experts at various oceanaria and research laboratories. They also discussed plans for the workshop in Wuhan next year.

Perrin also visited the Department of Fisheries at the National College of Marine Science and Technology in Keelung, Taiwan, where he gave two lectures on dolphin research. He also visited the small dolphinarium at Wan Li Hsiang and photographed several specimens of the spotted aduncus form of the bottlenose dolphin, Tursiops truncatus. (W. Perrin, FTS 893-6267)

MARINE MAMMAL ASSESSMENT

Harbor Porpoise Survey Completed

In September and October, a combined ship/aerial/shore-based survey of harbor porpoise was conducted along the California, Oregon, and Washington coasts. Harbor porpoise (Phocoena phocoena) are small, coastal marine mammals that have been subject to increasing mortality due to gill nets in recent years. Because of this mortality, the Center began a program last year to assess their distribution and abundance; this was the third survey since the program began.

The survey was coordinated by Dr. Jay Barlow (ship and shore operations) and Chuck Oliver (aerial operations); staff from the California Department of Fish and Game, the U.S. National Marine Mammal Lab, the Oregon Department of Fish and Wildlife, and the Washington State Department of Game also participated in the survey.

The NOAA Ship David Starr Jordan followed the cruise track from San Diego, along the coasts of California and Oregon to the Columbia River, and then back along the coast to San Diego. The Washington coastline was included in the original cruise plan but was excluded from the survey due to a storm.

The main objectives of the ship survey were 1) to survey along the 10-fathom isobath for the entire coast, 2) to determine the offshore distribution of harbor porpoise by surveying along the 10- , 30- , 50- ,

and 100-fathom isobaths in three limited areas, 3) to determine any ship-avoidance behavior by harbor porpoise in conjunction with shore-based observers, and 4) to compare data collected from surface vessels with data collected from aerial survey platforms. The ship survey methods were based on line-transect sampling and involved five observers who used 7-power binoculars. The scientific team consisted of eleven members who rotated among the five positions. The team consisted of Jay Barlow, Frances Mann, and Stephanie Sexton (all of the SWFC), Barbara Taylor and Betty Goetz (of the Northwest and Alaska Fisheries Center) and six volunteers (Peter Boveng, Sharon Bragg, Susan Kruse, Michael Newcomer, Alejandro Robles, and Barry Troutman).

Most of the objectives of the ship survey were accomplished. A total of 275 groups of harbor porpoise was seen, and the scientific team learned much about the offshore distribution of harbor porpoise. The density of animals was approximately constant out to 30 fathoms, the density decreased markedly from 30 to 50 fathoms, and no animals were seen along the 100-fathom isobath (Table 1). In addition to harbor porpoise, ten other cetacean species were seen, including common dolphins (8 groups), bottlenose dolphins (3), Pacific white-sided dolphins (2), killer whales (3), minke whales (10), blue whales (2), fin whales (1), humpback whales (6), gray whales (8), and Dall's porpoise (12). The work on harbor porpoise avoidance of the ship was not successful because the shore team was unable to track any dolphin groups when the ship was present. Nonetheless, data were collected for comparison with the aerial survey results.

Table 1. Harbor porpoise sightings per track mile for surveys along the 10- , 30- , 50- , and 100-fathom isobaths in three different locations.

Depth	Fort Bragg California	Coquille Pt Oregon	Tillamook Head Oregon
10-fathoms	0.093	0.426	0.921
30-fathoms	0.088	0.636	0.211
50-fathoms	0.052	0.146	0.0
100-fathoms	0.0	0.0	0.0

The aerial surveys performed a strip census methodology with a Cessna 182 aircraft in Oregon and Washington, and a Cessna 337 for the California work. The survey team consisted of a pilot and data recorder in the front seats, and two side-looking observers in the rear. Flights were generally made at an altitude of 700 feet and a ground speed of 90 knots. Each observer monitored two swaths approximately 1/8 mile wide. Hand-held inclinometers were used to determine declinations to each sighting, and positional data were obtained from a LORAN-C navigational unit.

The two major objectives of the aerial survey were 1) to repeat the previous year's survey at 1/3 mile from the coast for comparison of annual changes in harbor porpoise density and 2) to estimate density at 1 mile from the coast for direct comparison with ship estimates of density. Aircraft were provided by California Department of Fish and Game and through contracts from the National Marine Mammal Laboratory with the Washington Department of Game, and the Oregon Department of Fish and Wildlife. The surveys were planned and executed with the close cooperation of Doyle Hanan (CDFG), Robert DeLong (NMML), Steve Jeffries (WDG), and Robin Brown (ODFW).

These surveys were plagued by several episodes of bad weather. Only one flight on September 11 was completed for the Oregon coast; sighting conditions were poor and no harbor porpoise were seen. An additional flight to survey Oregon and Washington was completed on October 4 (SWFC did not participate, although data will be provided for analyses). In California, surveys were flown from September 16-20 with Chuck Oliver (SWFC), Doyle Hanan (CDFG), and Sandra Diamond (CDFG) as observers. Sixty sightings of harbor porpoise were made during these five days. Occasional fog and rain interfered with efforts to gather data at 1 mile from the coast and to assess any offshore changes in density. For this reason, another survey was scheduled for the California coast on October 14-15, with Oliver, Barlow and Hanan as observers. Sighting conditions on these flights were excellent and 86 sightings of harbor porpoise were made during the two days. A summary of all marine mammal sightings for the aerial surveys is given in Table 2.

Table 2. Total sightings of marine mammals during flights 1-10 and 12-13 of the aerial surveys in September and October 1985. (Flight 1 off Oregon, all others off California.) Data represent all sightings at sea, including those made off-effort and outside the strip being searched.

Species	No. sightings	No. individuals
Harbor porpoise	146	538
Gray whales	4	4
Unidentified porpoise	1	3
Southern sea otter	2	2
California sea lion	121	507
Northern elephant seal	2	2
Harbor seal	7	37
Steller sea lion	2	2
Unidentified pinniped	19	21
Unidentified whale	1	2

The objectives of the shore-based survey were 1) to gather data on the breathing and diving patterns of undisturbed harbor porpoise and 2) to observe any changes in behavior in the presence of the ship. Barbara Taylor (NMML) and a team of 6 observers were stationed at three rocky

headlands along the northern coast of Oregon. They were able to measure dive times for eleven groups of harbor porpoise. The mean time between surfacing bouts was 1.77 minutes. They were found to be visible above the surface of the water for only 6.5% of the time, but spent approximately 25% of their time in surfacing series. These results have very important implications for interpreting the ship and aerial survey data. Unfortunately, no porpoise were observed in the presence of the ship, so questions of ship avoidance are still unanswered.

During the coming year, data from this and the previous harbor porpoise surveys will be analyzed to estimate populations for the entire western coast of the continental United States. This information will help determine whether current levels of harbor porpoise mortality can be sustained by the population. (J. Barlow, FTS 893-6263)

TUNA/BILLFISH ASSESSMENT

Preparations Completed for 1985 Meeting of International Commission for the Conservation of Atlantic Tunas

Drs. Gary Sakagawa and Norman Bartoo of the Oceanic Fisheries Resources Division met with U.S. Commissioners to the International Commission for the Conservation of Atlantic Tunas (ICCAT) and their advisors in Washington, DC, on October 9 and 10, 1985. The meeting, which also included participants from other Fisheries Centers and Regions, was held to inform Commissioners and Advisors of the current conditions of Atlantic tuna stocks and fisheries, research conducted in support of ICCAT, and potential scientific issues which might arise at the November meeting. Sakagawa reviewed the U.S. role in ICCAT, coordination and research planning efforts undertaken in the last year, and all ICCAT related events for the year. Bartoo described the condition of yellowfin, skipjack, bigeye, and albacore stocks in the Atlantic. Sakagawa will serve as leader of the U.S. scientific delegation to ICCAT in November 1985.

Two documents for the November 1985 Standing Committee on Research and Statistics ICCAT meeting in Spain were prepared by David Au. The first document, "Interpretation of longline hook rates," reviewed the theory of random encounters with fish, reduction in efficiency from hook competition by non-target species, and the theory of prey clumping in making predators (or fishing gear) less successful. The conclusion was that prey clumping interacting with fishermen who are randomly fishing with longline gear could reduce gear efficiency and that the change in catch rates may underestimate the true changes in the size of stocks of target species.

The second document, "Significance of changes in catch and fishing effort in the eastern Atlantic yellowfin tuna fishery," addressed the question of the statistical significance of reduced catch and effort following departure of portions of the fishing fleet to Indian Ocean fishing grounds. This paper showed how the Monte Carlo randomization technique can establish confidence bounds about the equilibrium yield-effort relationship and how a simple statistical test determines the significance of departures of individual data points from the mean.

A third document, "Size and species compositions of Atlantic tuna imports landed in Puerto Rico, 1984," was prepared by Atilio L. Coan, Mathematical Statistician, Aaron Weinfield, Computer Assistant, and Eugene P. Holzapfel, Biological Technician. The manuscript presents results of sampling 4,798 yellowfin, skipjack, bigeye and albacore tunas from transshipments of foreign-caught Atlantic tunas landed in Puerto Rico and compares these results to results of sampling in previous years. In general, average sizes of fish in 1984 imports decreased for most species sampled, and percentages of yellowfin and bigeye tuna smaller than the minimum size (55 cm) were higher than in 1983 imports. (G. Sakagawa, FTS 893-6333)

Size Structure of North Pacific Albacore Population Investigated

Fishery biologists Dave Holts and Earl Weber returned on September 1 from a six-week research cruise aboard a commercial albacore gillnet vessel. The aim of their research, which began last year, is to provide an unbiased estimate of the size structure of the local north Pacific albacore population. Albacore (Thunnus alalunga), a temperate species of tuna, is caught commercially throughout the North Pacific and has an annual retail value in excess of 20 million dollars.

The albacore are harvested by several fisheries which use a variety of gears. Each of these gears selects a size range of fish particular to that type of gear. To date, the only measure of the size structure for this population is that derived from the commercial troll and baitboat fisheries. The catches from these fisheries produce different length frequencies and cannot provide an unbiased sample of the underlying population from which they were taken.

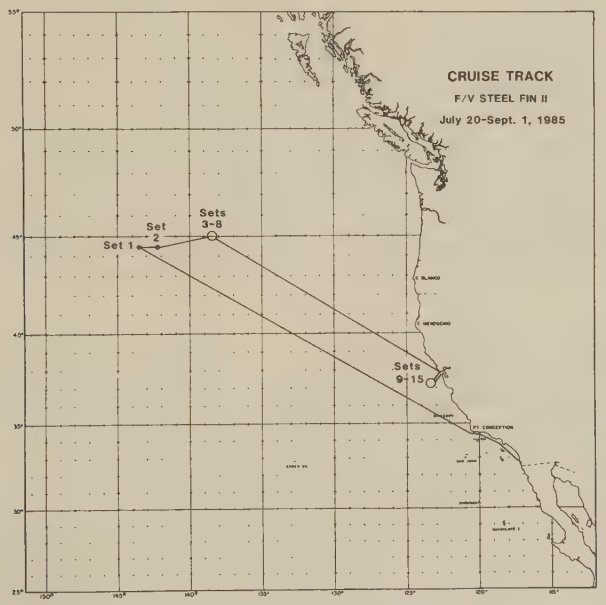


Figure 3. Cruise track showing location of offshore and near shore sampling stations.

In this experiment, the research gillnets, which were designed to sample specific lengths of albacore, were used to sample eight offshore and seven coastal stations (Figure 3). All sets were conducted at night close to the U.S. commercial troll fishery. These produced a total of 780 albacore. During day-time hours, commercial trolling operations were conducted and catch rates and fish sizes recorded. Trolling operations produced 3,300 albacore in 28 active trolling days (Table 1). The selectivity for albacore at each mesh type was recorded for all net caught fish as was the depth at which they were taken. Length frequency data were collected for a total of 1,118 albacore which measured 52 cm to 105 cm. The size frequency was bimodal with peaks at 64 cm and 74 cm and there was little apparent difference in size composition between gillnet and troll caught albacore (Figure 4). Fish caught in the offshore fishing area were taken higher in the net than those caught along the coast.

TABLE 1. Summary of set locations and conditions

DATE	SET NO.	SET TIME	LOCATION Lat. °N	LOCATION Long. °W	FLOATLINE DEPTH (m)	SOAK TIME (hours)	SST °C	BEAUFORT NO.	THERMOCLINE DEPTH (m)	DEPTH OF CATCH
7/28	1	2000	44 25	142 06	4	10.8	19.3	5	12	mid-net, 10-22 m
7/30	2	2115	44 34	143 30	4	8.8	15.8	5	16	upper third, 4-10 m
8/4	3	2130	44 59	138 31	4	9.3	16.7	4	25	upper half, 4-18 m
8/7	4	2200	44 47	138 39	4	9.5	16.4	3	38	upper third, 4-18 m
8/8	5	2130	44 47	138 39	4	9.0	16.2	3	38	upper half, 4-18 m
8/9	6	2200	44 49	138 57	4	10.5	16.6	4	26	upper half, 4-18 m
8/10	7	2130	44 45	138 55	4	10.5	16.9	3	26	upper two-thirds, 4-22 m
8/14	8	2200	45 14	138 52	4	10.5	16.3	4	27	middle half, 10-22 m
8/23	9	2130	37 02	123 13	4	10.0	17.4	4	40	lower third, 22-34 m
8/24	10	2000	37 02	123 22	8	11.0	17.4	4	34	lower half, 22-38 m
8/25	11	1800	37 09	123 25	8	13.5	17.4	4	36	lower middle, 22-30 m
8/26	12	2145	37 15	123 40	8	9.0	17.7	3	40	lower two-thirds, 14-38 m
8/27	13	2030	37 13	123 35	8	10.3	17.7	4	35	lower half, 22-38 m
8/28	14	2030	37 10	123 23	8	10.0	17.8	4	38	lower half, 22-38 m
8/29	15	2000	36 52	123 05	8	12.5	17.6	5	38	lower half, 22-38 m

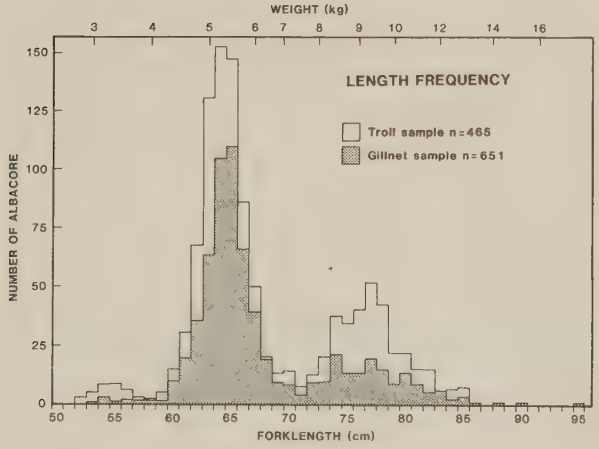


Figure 4. Length frequency of albacore caught by gillnet and trolling gear.

Total catch in the sampling net was:

Pacific albacore	Thunnus alalunga	780
Bigeye tuna	Thunnus obesus	1
Bullet mackerel	Auxis rochei	2
Swordfish	Xiphias gladius	2
Blue shark	Prionace glauca	726
Bigeye thresher	Alopias superciliosus	2
Bonito shark	Isurus oxyrinchus	2
Pacific pomfret	Brama japonica	2
Louvar	Luvarus imperialis	14
Ocean sunfish*	Mola mola	14
Squid	Ommastrephidae	5
Common dolphin	Delphinus delphis	1

*All released alive.

(N. Bartoo, FTS 893-6244)

BIOLOGICAL INVESTIGATIONS

SWFC Scientist Convenes Workshop on Applications of Microcomputers in Fisheries Stock Assessment and Management

Dr. Elizabeth F. Vetter, Operation Research Analyst, convened the first of a series of workshops on mathematical analysis of stock dynamics, which was part of the 115th annual American Fisheries Society (AFS) meeting at Sun Valley, Idaho. The workshop, held on September 7, was sponsored by the Marine Fisheries Section of the AFS. This first workshop was the culmination of planning which began in 1982 by Dr. Gary Sakagawa, Chief of the Oceanic Fisheries Resources Division. The purpose of these workshops is to provide specialized training in the use of microcomputers for stock assessment research and to provide a forum for critical reviews and evaluations of both new and traditional methods in fishery stock assessment.

The workshop consisted of a lecture series in the morning and microcomputer demonstrations of several fisheries stock assessment programs in the afternoon. The morning session featured lectures on logistic assessment models (Dr. William Fox, University of Miami, Florida) age-structured models (Dr. Richard Deriso, Pacific Halibut Commission), structural indices (Dr. Richard Anderson, National Fish Hatchery and Technology Center), and the history of microcomputers in fish stock assessment (Dr. Carl Walters, University of British Columbia).

During the afternoon session Jerry Auld and Fox demonstrated applications of general production models, and Phil Neal demonstrated programs for catch-age analysis. Additional topics included virtual population analysis, fishery economics, stock reduction analysis, analysis of farm pond fisheries, and field data acquisition systems.

This first workshop was well attended and well received. More than 40 scientists attended the morning session and over 60 participated in the afternoon session. Both lecturers and demonstrators were pleased with the positive responses they received from many of the participants.

Vetter is currently organizing (with Bernard Megrey of the Northwest and Alaska Fisheries Center and Doug Vaughan of the Southeast Center) a second workshop/symposium to be held next September in conjunction with the 116th annual AFS meeting, to be held in Providence, Rhode Island. This second workshop will be co-sponsored by Marine Fisheries and the Computer Users Section of the American Fisheries Society. The topics for this second workshop will include cohort analysis, mechanistic models, and multispecies models; the program will be expanded to include a half-day of papers on various research applications of the methods discussed and demonstrated during the lecture and microcomputer session. (E. Vetter, FTS 893-6285)

PACIFIC FISHERIES ENVIRONMENTAL GROUP
Monterey, California

NOAA's 15th Anniversary and Monterey Bay Aquarium's 1st Anniversary Celebrated

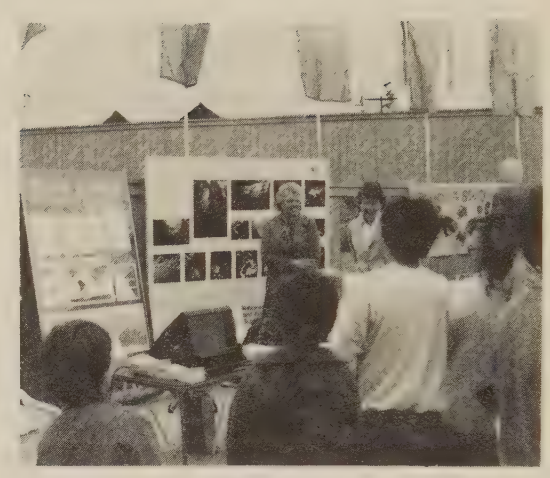
On Sunday, October 20, the Pacific Fisheries Environmental Group and other NOAA agencies in the Monterey Bay area celebrated NOAA's 15th anniversary. Joining in the occasion was the Monterey Bay Aquarium, celebrating their first anniversary. Among the thousands of people attending the displays were Congressman Leon Panetta (D - California), mayors from local cities, and state and local dignitaries. (See photos next page.)

The staff of the PFEG manned an exhibit in the plaza area near the Aquarium's main entrance on Cannery Row. The exhibit included a pictorial display from NOAA headquarters, a kelp forest display borrowed from the Tiburon Laboratory of the Southwest Fisheries Center, and a display of PFEG ocean climate research describing XBT usage and application to El Niño studies. A brochure on NOAA's 15th Anniversary, produced by the National Ocean Service, was distributed, and a 30-minute video presentation, "The Seventh Service," which described NOAA and NOAA Corps, was shown several times throughout the day. A number of civic and conservation organizations had exhibits honoring the Aquarium's first birthday. The Monterey Bay Aquarium is, by certain measures, the largest in the world, and certainly unique in many aspects. It is a source of great local interest and civic pride.

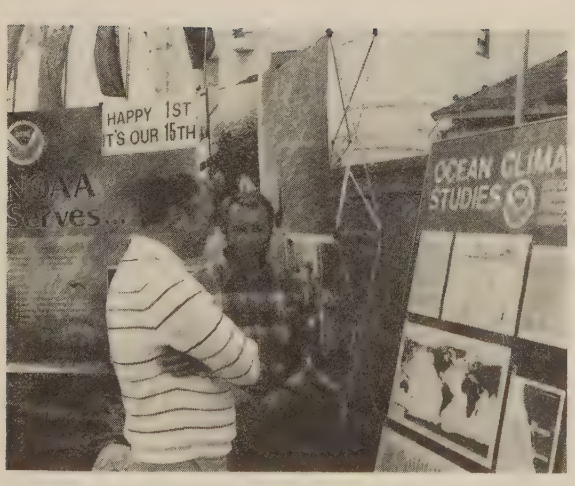
The day concluded with an outdoor laser show projected from the roof of the Aquarium, a display of fireworks, and street dancing on Cannery Row to the music of a Brazilian samba troop.

Staff from the PFEG who manned the exhibit were Andy Bakun, Jan Mason, Rusty Brainard, Jerry Norton, Dave Husby, and Rosemary Troian. Paul Sund planned and coordinated the exhibit along with CDR Paul Duernberger, the NOAA Liaison Officer at Fleet Numerical Oceanography Center. (Paul N. Sund, (408) 646-3311)

King Neptune pays a royal visit.



Administrative officer Rosemary Troian (left) and biological technician Jan Mason answer questions about the Kelp Forest Ecology Display prepared by the Tiburon Laboratory.



Oceanographer Jerry Norton (right) discusses PFEG ocean climate studies.

View of Cannery Row during the festivities. The Monterey Bay Aquarium in the background.

TIBURON LABORATORY
Tiburon, California

Groundfish Coordination Meeting Held

On October 16, a meeting to coordinate groundfish research within the Pacific Coast portion of the Southwest Region was held at the Tiburon Laboratory. Chaired by Norman Abramson, Southwest Fisheries Center Groundfish Research Coordinator, the session was attended by scientists from the Center's Coastal Division, Pacific Fisheries Environmental Group, and Tiburon Laboratory, as well as a representative from the California Department of Fish and Game. The scientists discussed 1985 research activities and plans for 1986. Coordination meetings will be held semi-annually. (N.J. Abramson, FTS 556-0565)

UNDERUTILIZED FISHERY RESOURCES INVESTIGATION

Deepwater Fishes off California May Have Good Market Potential

During a 10-day cruise aboard the NOAA research vessel David Starr Jordan off California last month, fishery biologists from the laboratory in Tiburon, California, fished the deep-sea basins from San Diego to Morro Bay. Their mission was to assess the numbers of potentially marketable deepwater fishes, particularly a little known group called grenadiers, related to the cods. The cruise produced a number of fish species which will interest both commercial fishermen and seafood fans.

Under the direction of chief scientist Susumu Kato, two kinds of fishing methods were used. A conventional bottom trawl net was used to sample fishes at depths of 1,500 to 4,400 feet. When floats, which were needed to keep the net open, were crushed by the extreme water pressure in deep waters, a line with 50 baited hooks was used to catch fish at depths to 5,300 feet. The fishing line was equipped with a magnesium wire link which dissolved about 6 hours after being set, allowing the line to break free of the anchor and float to the surface. A small radio transmitter emitted a signal which helped in the recovery of the gear and the fishes which were caught on the hooks.

In the deep offshore canyons between San Diego and Santa Barbara, the trawl tows produced only a few fish. Kato reported, however, that these fish were a fishery scientists dream--exotic specimens with descriptive names such as the longfin dragonfish, Pacific viperfish, blacktail snailfish, shiny loosejaw, hatchetfish, and black smelts--all taken in good condition. The best catch, using a line of 50 baited hooks set in 4,350 feet produced 25 Pacific grenadiers.

North of Point Conception, in an area known to fishermen as the Santa Lucia Bank, bottom trawl tows were much more successful, yielding such commercial species as the Dover sole, sablefish, blackgill rockfish, and channel rockfish. In addition, good hauls were made of Pacific grenadier and aurora rockfish, neither widely used at present. Significant and, according to Kato delicious, catches of invertebrates included tanner and king crabs, small whelks, octopus, shrimp, and squid. The largest king crab taken was 5 pounds, while some of the tanner crabs reached weights of 1-1/2 pounds.

Good catches of Dover sole were made in 1,575 feet (340 pounds in a 1/2 hour net tow), and in 3,000 feet (770 pounds in 1 hour). The best catches of channel rockfish and sablefish were more than 300 pounds of each species taken in 1-hour tows. Kato, an expert on underutilized fish and invertebrate resources, believes that if all the species available were utilized, the fishing grounds of the commercial trawler fleet could be significantly expanded by fishing the deep waters near Santa Lucia Bank. The numbers of channel rockfish were especially encouraging to Kato since the two species taken are valuable export items for the Japanese market.

The Pacific grenadier, the most common of the four species of grenadiers taken during the cruise, averaged around 2 pounds each and yielded about 6/10 of a pound of fillet. According to Kato, the meat is white and firm, and delicately flavored, and is equally tasty whether baked, barbecued, fried, or smoked. While the abundance of Pacific grenadier may not be high enough to support a fishery directed at them primarily, the fish could certainly be utilized when caught with others in the present deepwater trawl fishery which is targeted on Dover sole, sablefish, and channel rockfish.

Kato plans a second fishing trial in December 1985 to be conducted over a wider area to learn more about the distribution and abundance of the Pacific grenadier and associated deepwater species.

GROUNDFISH PHYSIOLOGICAL ECOLOGY INVESTIGATION

California Department of Fish and Game Monitors Striped Bass for 1985

The California Department of Fish and Game (CDF&G) continues the striped bass monitoring program initiated by the Tiburon Laboratory. In this program, CDF&G biologists analyze tissue samples for low molecular-weight petroleum hydrocarbons. They analyze for cyclohexane, benzene, dimethylcyclohexanes, toluene, methylcyclohexane, ethylbenzene, ethylcyclohexane, and xylenes. Currently Diane Knudsen, CDF&G Fisheries Biologist, and research chemist Pete Benville have used the gas chromatograph of the Groundfish Physiological Ecology Investigation to analyze 45 liver samples. Some of the 1985 samples appear to contain toluene, ethylbenzene, and xylenes.

The same 45 samples were concentrated and are being reanalyzed to see whether some may contain previously undetected amounts of the low

molecular-weight hydrocarbons. CDF&G has purchased three new columns for the gas chromatograph in order to complete the analyses, and will replace the original column when the work is finished.

In this cooperative effort by NMFS and CDF&G to monitor the health of striped bass, Knudsen is also learning from fishery biologists Michael Bowers and Dr. Jeannette Whipple to prepare ovary sections and determine the egg resorption rate as a measure of reproductive health. (P. Benville, FTS 556-0565)

Arrangements Completed for December Research Cruise

Michael Bowers, Fishery Biologist, has completed arrangements for the December cruise aboard the NOAA Ship David Starr Jordan, which will depart Sausalito, California, December 13 and return December 20. Operations will be conducted in the vicinity of the Farallon Islands and Cordell Bank. The main objective of this cruise is to collect samples from four Sebastes species-- bocaccio, shortbelly rockfish, blue rockfish, and yellowtail rockfish. Members of the Groundfish Physiological Ecology Investigation will assess the condition and reproductive state of these species. Subsampled tissues will be preserved for biochemical and histological analyses. Susan Smith, Fishery Biologist from the Groundfish Community Investigation, will conduct a continuing euphausiid survey in the Gulf of the Farralones. Other participants include members of the Environmental Protection Agency, who will collect nonspecific fauna for radio nuclide analyses, and members of the Point Reyes Bird Observatory, who will continue their study of the distribution and abundance of feeding seabirds in the vicinity of the Farralon Islands. (M.J. Bowers, FTS 556-0565)

GROUNDFISH ANALYSIS INVESTIGATION

Sampling Plan for the Washington-Oregon-California Sablefish Fishery

Dr. Joseph E. Hightower, Fishery Biologist with the Groundfish Analysis Investigation, recently completed a report describing alternative sampling plans for the Washington-Oregon-California sablefish fishery. Some sablefish are discarded at sea, and others are dressed at sea, so age or sex cannot be determined by port sampling. Hightower addressed these practical problems by offering four alternative sampling programs: (1) continue to manage the resource using landings data and information from NOAA survey cruises; (2) implement a port-sampling program that would provide information on the length and age composition of the landed catch; (3) implement a port-sampling program and obtain supplemental information on discarded fish by limited sea sampling; or (4) implement a full sea-sampling program to determine the length and age composition of the total catch, including discards. For the last three alternatives, Hightower recommends sampling procedures, discusses the reliability of the data for management, and reviews applicable management models.

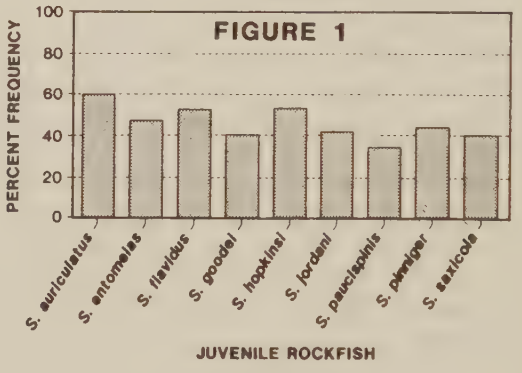
The alternative that Hightower recommended is to implement a trial port-sampling program, similar to existing programs for rockfish. Biologists from the state agencies for the three states have tentatively agreed to implement the pilot program. For the first year, the data will be compiled at the Tiburon Laboratory for final analyses. These results will be used to refine the sampling plan, which is preliminary because information is limited on the composition of sablefish landings. The report has been distributed to West Coast sablefish biologists for comments. After revision, the report will be published as a NOAA Technical Memorandum. (J. Hightower, FTS 556-0565)

Several Species of Juvenile Rockfish Found to Have Similar Diets

Carol Reilly, Biological Technician, and Tina Wyllie Echeverria, Fishery Biologist with the Groundfish Analysis Investigation, have been investigating the stomach contents of young-of-the-year rockfishes to obtain a better understanding of their feeding ecology. Collections have been made during the annual research cruises conducted in June of each year since 1983. Reported here are the collections made in 1984 with the midwater trawl along the central California coast and analyzed for stomach contents. Stomach contents from 295 fish representing nine species (Sebastes auriculatus, S. entomelas, S. flavidus, S. goodei, S. hopkinsi, S. jordani, S. paucispinis, S. pinniger and S. saxicola) were analyzed.

All prey items were counted and identified to the lowest taxonomic level possible. The prey categories with the highest frequency of occurrence were the copepod Calanus sp. (34-60%) (Figure 1), Copepoda (which includes juvenile copepods and those too digested for species identification (32-100%) (Figure 2) and the furcilla stage of Euphausiacea (6-80%) (Figure 3). Eight other prey categories were identified from the rockfish stomachs.

FREQUENCY OF OCCURRENCE
of Calanus sp.



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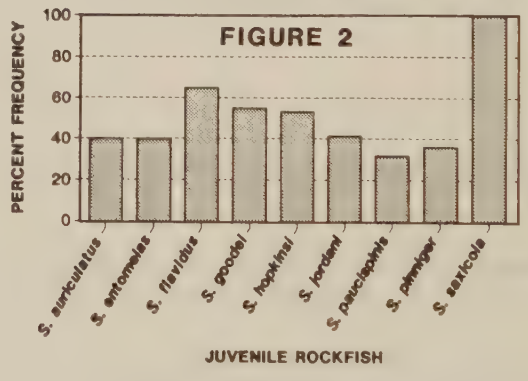
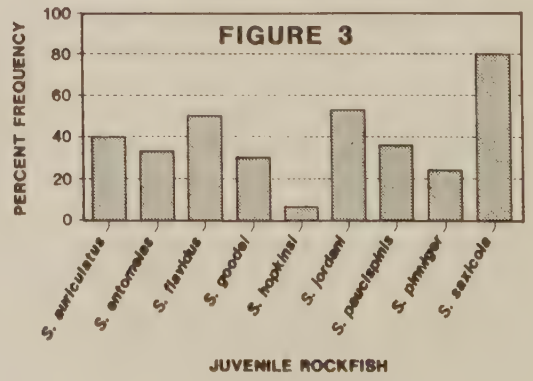
of Copepoda



FREQUENCY OF OCCURRENCE
of Euphausid (furcilia)



The principal prey types for eight of the nine species were surprisingly similar. Only one rockfish species, S. paucispinis, had fish larvae as a prey item (20%). (T. Wyllie Echeverria, FTS 556-0565)

GROUNDFISH COMMUNITIES INVESTIGATION

Balance between Mortality and Continued Recruitment Determines Numbers of First-Year Juvenile Rockfishes

The 1985 year class of many rockfish species (Sebastes spp.) has been the richest of recent years, a fact that was established during the spring by collections and observations of first-year juveniles made by members of the Groundfish Communities Task. The data came from trawl catches, predator gut contents, and underwater observations (see Report of Activities, May-June 1985) and raise the question: how do these numbers stand up under the very high mortalities these fishes suffer during their first months in the benthic habitats? When juvenile rockfishes are super-abundant, they (like other potential prey) become the primary food of many predators, including some that do not consider them prey during more typical times. As a result, mortality due to predation is proportionally greater when the juveniles are more numerous. This year these juveniles have dominated the gut contents of groundfishes (Figure 4) studied by researchers at the Tiburon Laboratory, and have been regurgitated in large numbers from the fish caught by fishermen all along the northern California coast. They also have been the major prey of marine birds under study by researchers at the Point Reyes Bird Observatory.

Figure 4. Lingcod, Ophiodon elongatus, feeds primarily on juvenile rockfishes when these prey are present in large numbers.

Mortality has clearly taken a heavy toll on these juveniles during their first few months in the nearshore habitats. This loss has been offset to some extent, however, by continued recruitment throughout this period, as observed by members of the Fish Communities Investigation--Investigation Leader Dr. Edmund Hobson, fishery biologist Tony Chess, and fisheries technician Dan Howard. They are interested in the extent to which this continued recruitment has compensated for the concurrent loss to predators. Determining the extent of the compensation is limited to monthly counts (May-August) of the major species at a reef complex near Albion in Mendocino County (Table 1).

Table 1. Mean numbers of juvenile rockfish counted per minute.

	May n=45	June n=52	July n=79	August n=50
yellowtail	148.44	232.77	191.54	115.60
blue	74.69	102.35	103.16	70.56
black	4.07	3.00	6.32	4.34

These data are consistent with the general observation that the numbers of juveniles arriving in the nearshore habitats peaked during late June. The subsequent decline in these numbers suggests that the continued recruitment, though heavy, compensated only partially for the losses to predation and other sources of mortality. If future year-class strength can be predicted from numbers of first-year juveniles, the index is best based on the numbers present at the end of the recruitment season. (E.S. Hobson, FTS 556-0565)

FISHERIES INFORMATION SYSTEMS & ADP

On-Line Financial Report System Fully Implemented

The Financial Reporting System (FRS), a menu-driven, interactive data entry and report generating system which is used to track Southwest Fisheries Center finances, is now a fully operational, on-line reporting system, according to Ben Remington, Executive Officer. The FRS "resides" on the La Jolla Laboratory's Molecular Supermicro computer 32X.

The accounting staffs at the La Jolla, Honolulu, and Tiburon Laboratories can now enter the commitment data into the FRS files on their respective 32Xs. The files from Honolulu and Tiburon are transmitted through the telecommunication linkages to the 32X in La Jolla for inclusion in the commitment data base.

At the request of the user, the FRS can generate financial statements either Center-wide or for groups within the Center such as Laboratories, Divisions, and even Tasks. Rob Bistodeau, Computer Programmer Analyst, who was the primary developer of the on-line system, visited the Center's laboratories in Monterey, Tiburon and Honolulu in October to train users on the system and distribute the documentation manual.

On-Line CalCOFI Data Systems Demonstrated

In the fall of 1983 work started to expand the California Cooperative Oceanic Fisheries Investigation (CalCOFI) Data System to include historical data sets and to integrate information on Other Fish Larvae (OFL) into the system as well. To expedite the process, Larry Zins, Computer Programmer, was employed in July 1984 to develop and implement the interactive OFL data entry programs and the selective data extraction programs and to integrate these programs into a user-friendly menu selection system.

On October 9, Zins, Rich Charter, CalCOFI Data Manager, and Dorothy Roll, Computer Systems Analyst, gave a demonstration of the on-line CalCOFI software package to Director Barrett, Deputy Director John Carr, Coastal Division Leader Reuben Lasker, and Planning Officer David Mackett. According to Roll, there are two entry levels in the menu-driven system: data entry and data query. For the data entry portion, Zins demonstrated the entry of Other Fish Larvae data onto the screen; for the data query portion, he extracted information in response to the criteria selected. Both the oceanographic and biological data files were accessed for information retrieval.

SWFC Data Files Described for NEDRES

Dorothy Roll, Computer Systems Analyst, reported that James Payne, a computer assistant employed by the Center's ADP Operations under the University of California San Diego's Work Study Program, completed the description of the SWFC data files for input to the National Environmental

Data Referral Service (NEDRES) Data Base. NEDRES, which funded the work, is a convenient and searchable source of environmental information which is contributed by private, academic, federal and state agencies.

Payne produced file descriptions for the 32 files maintained by the Pacific Fisheries Environmental Group and the La Jolla and Tiburon Laboratories in the required NEDRES database format. Detailed descriptions for the 128 files from the Honolulu Laboratory were forwarded to the NEDRES staff who will prepare them in the correct format for input into the national system.

ADMINISTRATIVE ACTIVITIES

ADP Management Review Continues at SWFC

A study conducted by the Southwest Fisheries Center's ADP Management Review Study Team, led by executive officer Ben Remington, is presently underway to review current ADP activities at the Center. (This study was formerly the ADP A-76 review.)

Five meetings of the Review Study Team took place during September and October, supplemented by a series of draft write-ups which were distributed to Team members for comment. Work continues on the draft with a first draft scheduled for review by Director Barrett on November 8.

A mid-term progress review is scheduled to be held during the week of December 2 with Darrell Tidwell, NMFS A-76 Review Coordinator, and Dean Brinker of NOAA scheduled to participate. The final report by the Study Team is due in February 1986. (B. Remington, FTS 893-6248)

MISCELLANEOUS

PUBLIC AFFAIRS

La Jolla Laboratory

New Federal Women's Program Committee Members Plan for New Year

In October 1985 responsibility for the Federal Women's Program at the SWFC in La Jolla, California, was turned over to three new committee members--Christina Perrin, Priscilla Akin, and Cynthia Thomson. The committee's first activity of the fiscal year was promotion of Women's Opportunity Week, a San Diego-wide event.

In October the committee sponsored a survey of women and men at the SWFC to determine their preferred seminar topics. Women were also asked a number of questions on the extent of their past participation and likelihood of future participation in FWP activities. The questionnaire elicited responses from 84% of the women and 38% of the men at the SWFC. The results have been tabulated and analyzed and will be used as guidelines for planning future activities.

During the next year the committee will continue to sponsor seminars and circulate articles on topics related to "women's" issues. They also plan to expand the FWP Career Development Reference Library with audio learning cassettes and other informational aids. Committee members encourage all staff, men and women, to participate in its programs.

Pacific Fisheries Environmental Group

October 20 - PFEG celebrated NOAA's 15th birthday and the Monterey Bay Aquarium's first birthday by hosting an exhibit at the Aquarium. The Kelp Forest display which was borrowed from Tiburon was very popular.

Tiburon Laboratory

September 26 - Jeannette Whipple presented a seminar at the Bodega Marine Laboratory on the research activities of the Tiburon Laboratory.

October 20 - Sennen Salapare set up and manned an exhibit showing activities of the La Jolla and Tiburon Laboratories at the 10th Annual Fishermen's Festival at Avila Beach, California.

29 - Jeannette Whipple spoke on the effects of pollution on striped bass to students in a class on natural resources at UC/Berkeley.

PRESS RELEASE

Honolulu Laboratory

September 25 - "Larval Fish Distribution Studied on Research Cruise."

La Jolla Laboratory

October 10 - "Pacific Sardine Begins Comeback off California."

Tiburon Laboratory

October 24 - "Deepwater Fishes off California May Have Good Market Potential."

SEMINARS

Honolulu Laboratory

September 18 - Dr. Yoshirou Watanabe, Tohoku Regional Fisheries Research Laboratory, Shiogama, Japan, spoke on "Saury fishery and surveys in Japan."

October 2 - Robert G. Forsyth spoke on "Baseline study of green turtles at Johnston Atoll."

16 - Dr. Ancel Johnson, formerly of the U.S. Fish and Wildlife Service, Anchorage, Alaska, spoke on "Sea otter research in Alaska, 1974 to present."

30 - Augustine Mohiba, Department of Primary Industry, Fisheries Research Division, Papua New Guinea, spoke on "An overview of fisheries research in Papua New Guinea."

La Jolla Laboratory

October 16 - Lenora Carey of Carey Films presented the film, "The Muro Ami Dilemma."

Pacific Fisheries Environmental Group

October 17-18 - Paul Sund attended the Monterey Gray Whale Workshop.

VISITORS

Honolulu Laboratory

September 10-18 - Dr. Yoshirou Watanabe, Tohoku Regional Fisheries Laboratory, Shiogama, Japan, visited Dr. Boehlert and participated in LEG II of cruise TC-85-04.

10-20 - Dr. H. Geoffrey Moser, SWFC La Jolla, California, participated in part of LEG II of cruise TC-85-04, and worked with Dr. Boehlert, Fishery Biologist Bruce C. Mundy, and Research Assistant Michael P. Seki to identify larval fishes collected on various cruises.

19 - Dr. Edward Myers, NOAA Ocean Minerals and Energy Division, Washington, DC, visited Drs. Boehlert and Harrison to discuss OTEC related research.

24 - Bill Perkins, Western Fishboat Owners Association, San Diego, California, met with Richard Shomura and Dr. Jerry A. Wetherall to discuss South Pacific albacore fishing and research.

26 - Mr. and Mrs. Naozumi Miyabe visited the Laboratory en route to Japan. They were given a tour of the Kewalo Research Facility by Richard Shomura.

30 - David P. Charbonneau, Office of Audits, DOC, Seattle, Washington, met with Richard Shomura to discuss the Maui baitfish project.

October 3-4 - Richard Shomura met with Z.Y. Chen, Academy of Sciences of Guangxi, J.Z. Luo, Guangxi Institute of Oceanography, and Y.F. Lao (interpreter). The visitors were given tours of the Hawaii Division of Aquatic Resources' Anuenue Research Facility, Amorient Farm, Oceanic Institute, and the Hawaii Institute of Marine Biology.

16 - Robert S. Otto, NMFS, Kodiak, Alaska, met briefly with Richard Shomura.

17 - Shozo Akasaka, Asahi Chemical Industry Co., Osaka, Japan, visited Richard Shomura and Dr. Polovina.

25 - David Powell, Director of the Monterey Bay Aquarium, toured the Kewalo Research Facility.

30 - Dr. Jae-Sang Hong, Biological Oceanography Laboratory,

Korea Ocean Research and Development Institute, Seoul, Korea, visited Howard O. Yoshida.

31 - Dr. J.A. Colman, Ministry of Agriculture and Fisheries, Fisheries Research Centre, Wellington, New Zealand.

La Jolla Laboratory

September 9-13 - David Keever and Dr. Aleco Christakis, Center for Interactive Management, Fairfax, Virginia, were at the Center to facilitate the Tuna Fisheries Forum.

16-17 - Dean Parsons, NMFS Office of Resource Investigations, Washington, DC, met with John Carr at the Center.

17 - An Agricultural Tour Group of 15 Japanese visited the Center.

25-26 - From the People's Republic of China, Mr. Z.Y. Chen, Vice President of Guangxi Academy, Mr. J.Z. Luo, Director of the Guangxi Institute of Oceanography, and Mr. Y.F. Lao, Microbiologist and Interpreter, visited with staff to discuss research conducted at the Center.

October 7-11 - John Cass, Government Accounting Office, Seattle, Washington, discussed vessel operations with staff members at the Center.

8-12 - Dr. J.A. Colman, Assistant Director, Ministry of Agriculture and Fisheries, Fisheries Research Centre, Wellington, New Zealand, visited the Center.

Pacific Fisheries Environmental Group

September 10 - Dorothy Roll, Systems Analyst, La Jolla, California, visited PFEG to discuss ADP operations with various staff members.

19 - A fishery youth study group sponsored by the Shizuoka Prefectural Government, Japan, visited PFEG and talked with senior scientists.

26 - Admiral Taggart, Director of the NOAA Corps, visited PFEG and met with LT (jg) Rusty Brainard. Taggart encouraged Brainard's interest in seamount research and other insular research studies.

October 4 - Rob Bistodeau, Program Analyst, La Jolla, California, worked with Dave Husby and Rosemary Trolan on report generation and input for the Financial Reporting System.

15 - Steve Reilly, Operation Research Analyst, La Jolla, California, visited to discuss possibilities for

environmental sampling on marine mammal census cruises in the Eastern Tropical Pacific.

22 - Dan Gotshall (CDFG) met with Dick Parrish and Donna Mallicoate to discuss processing and analyzing recreational fisheries data.

Tiburon Laboratory

September 10 - Paul Bartram, Western Pacific Fishery Council, Honolulu, Hawaii, met with Ed Ueber to discuss limited entry and management of groundfish species.

11 - Dorothy Roll, Systems Analyst, La Jolla, California, visited to discuss computer needs.

13 - C.L. Jensen, University of Alaska Sea Grant, Kodiak, met with Sus Kato to discuss sea urchin processing.

October 3 - Rob Bistodeau, Program Analyst, La Jolla, California, met with Wally Giguere and Nancy Wiley to help with the Financial Reporting System.

7 - Carol Rideout, Virginia Institute of Marine Sciences, met with Jeannette Whipple to discuss work on striped bass in the San Francisco Bay-Delta. Rideout is developing bibliographies on pollution in major estuaries.

10 - Dr. Kazuhiro Nakaya, shark researcher from the Faculty of Fisheries, Hokkaido University, Hakodate, Japan, visited Sus Kato.

16 - Andy Bakun, Dick Parrish, and Jerry Norton (Pacific Fisheries Environmental Group, Monterey), Doug McLain (National Ocean Service, Office of Ocean Services, Monterey), Frank Henry (California Department of Fish and Game, Menlo Park), Richard Methot and Dale Squires (SWFC, La Jolla), attended a Groundfish Coordinating Meeting.

22 - Frank Henry and Pete Kalvass, California Department of Fish and Game, met with Bill Lenarz to discuss flatfish sampling.

23 - Pamela Picardy, a public relations and media specialist, interviewed Sus Kato for a NOAA-sponsored series of radio programs. Topics included underutilized species and fisheries development.

24 - Don Smith, Ooga's Smoked Seafoods, Half Moon Bay, California, met with Sus Kato to discuss use of grenadiers as a seafood delicacy.

MEETINGS AND TRAVEL

Honolulu Laboratory

September 23 - Richard S. Shomura attended a meeting of the Board of Directors, Pacific Fisheries Development Foundation.

25 - Dr. George W. Boehlert attended a meeting of the Coordinating Council for Research on Seafloor Processes at the University of Hawaii.

October 14-18 - Dr. Richard W. Brill attended the fall meetings of the American Physiological Society in Niagara Falls, New York.

22-24 - The Hawaii Sea Turtle Recovery Team met in the conference room. Richard Shomura welcomed the meeting participants at the beginning of the session.

24 - Drs. Boehlert, Ralston, and Skillman, and Samuel G. Pooley attended a meeting of the bottom fish planning team at the Western Pacific Regional Fishery Management Council.

25 - Richard Shomura gave a presentation on "Fishery data base of the Southwest Fisheries Center Honolulu Laboratory, National Marine Fisheries Service" at an informal briefing before the House Committee on Ocean and Marine Resources at the State Capital. The briefing was arranged by State Representative Peter K. Apo, Chairperson, House Committee on Ocean and Marine Resources.

28-29 - Dr. John T. Harrison participated in meetings of the proposal review committee for the Hawaii Undersea Research Laboratory.

La Jolla Laboratory

September 3-5 - Daniel Huppert met with members of the Groundfish Limited Access Working Group and members of the Groundfish Alternative Management at the Marine Science Center in Newport, Oregon.

3-8 - Rennie Holt traveled to Dartmouth, Nova Scotia, Canada, to present a paper at the 7th annual meeting of the Northwest Atlantic Fisheries Organization.

4-9 - Jeanne Wexler went to San Clemente Island, California, to obtain counts, scats, tag resights, and salvage information of pinnipeds, and to perform tagging of California sea lion pups.

6-9 - Laura Wing helped with tagging of California sea lion pups on San Clemente Island, California.

7-12 - Elizabeth Vetter convened a microcomputer symposium at the American Fisheries Society meeting in Sun Valley, Idaho.

10 - Director Izadore Barrett traveled to Davis, California, to meet with University of California Davis, officials regarding laboratory space at Bodega Bay.

9-13 - Charles Oliver conducted an aerial survey for harbor porpoise along the Oregon and Washington coasts.

10-20 - Geoffrey Moser traveled to Honolulu, Hawaii, to board the NOAA Ship Townsend Cromwell to participate in a vertical distribution cruise and work on fish larvae in the Honolulu Laboratory following the cruise.

A Tuna Fisheries Forum, sponsored by Dr. Joseph Angelovic, Deputy Assistant Administrator for Science and Technology, and coordinated by Mike Fraser of his staff, was held at the Southwest Fisheries Center in La Jolla, California, September 11-12, 1985. Dr. Alexander Christakis, Director, and David Keever of the Center for Interactive Management, facilitated the proceedings of the Forum.

All of the participants at this meeting were from outside the government and represented diverse views, although they shared a common interest in tuna and other large oceanic pelagic resources and their related fisheries. The purpose of the Forum was to begin a strategic planning process for agency research to maximize the benefits of the worldwide tuna resources, and to enable the participants to identify goals and objectives for an effective research program for tuna and other large pelagic resources.

Dr. Alexander Christakis (left) facilitates Tuna Fisheries Forum.

September 13-16 - Susan Chivers tagged sea lion pups on San Nicolas Island.

13-17 - Mark Lowry traveled to San Nicolas Island to tag California sea lion pups.

16-18 - Director Barrett attended the Pacific Council's Scientific and Statistical Committee meeting in Portland, Oregon.

18-21 - Norman Bartoo attended an ICCAT Standing Committee on Research and Statistics Officers' meeting in Miami, Florida.

22-27 - Paul Fiedler went to Washington, DC, to search satellite imagery archives of the National Environmental Satellite Data and Information Services.

September 28-October 5 - John Hunter traveled to Iliolo City, Philippines, to attend a meeting of a Technical Advisory Group for a U.S. AID project on milkfish.

September 28-October 10 - Paul Smith traveled to Vigo, Spain, to attend a U.S.-Spain Joint Committee on Science and Technological Workshop and to London, England, to represent SWFC at the Eastern Atlantic Sardine and Anchovy Recruitment Program Conference.

October 2 - Izadore Barrett met with officials of the Bodega Bay Laboratory in Bodega Bay, California.

3-4 - Rob Bistodeau trained personnel on the use of the Financial Reporting System at the Tiburon Laboratory and the Pacific Fisheries Environmental Group.

4-27 - William Perrin traveled to Wuhan, China, and to Taipei, Taiwan, to deliver lectures and participate in field research on two species of dolphin.

8-10 - Norman Bartoo traveled to Washington, DC, to attend an International Commission for the Conservation of Atlantic Tunas (ICCAT) briefing.

8-11 - Gary Sakagawa went to Washington, DC, to attend an Advisory Committee meeting of the U.S. section to ICCAT and report on research activities in progress for the November meeting of ICCAT.

9-11 - Richard Methot met with the Groundfish Management Team in Portland, Oregon, and with Oregon State University researchers in Newport, Oregon, to discuss plans for research on groundfish. He presented a seminar on juvenile fish studies at the Marine Science Center in Newport, Oregon.

12-15 - David Holts attended a conference on sharks in Portland, Oregon.

14-15 - Wayne Perryman and Hannah Bernard traveled to San Miguel Island to conduct quarterly stranding and entanglement census of pinnipeds.

14-17 - Daniel Huppert presented a seminar on the Pacific Groundfish limited access study in Washington, DC, and presented a similar talk at the NMFS Economists Workshop in Rockport, Massachusetts.

14-18 - Michael Laurs traveled to Honolulu, Hawaii, to participate in a planning meeting for albacore research in the South Pacific.

14-19 - Steve Reilly participated in a workshop on Gray Whales and consulted with members of the PFEG staff in Monterey, California.

15-17 - Izadore Barrett attended the annual meeting of the Inter-American Tropical Tuna Commission in Tokyo, Japan.

- Sam Herrick attended the NMFS Economists Workshop in Rockport, Massachusetts.

16-17 - Richard Methot and Dale Squires met with SWFC researchers in Tiburon, California, and with California Department of Fish and Game researchers in Menlo Park, California, to discuss current and planned groundfish research projects.

October 16- November 3 - Rob Bistodeau traveled to Honolulu, Hawaii, to train personnel on the use of the Financial Reporting System.

October 21-24 - Attending the 1985 CalCOFI Conference in Idyllwild, California, from the La Jolla Laboratory were: David Ambrose, Izadore Barrett, Andrew Bindman, John Butler, Paul Fiedler, Sharon Hamer, John Hunter, Reuben Lasker, Nancy Lo, Ronald Lynn, Eric Lynn, Alec MacCall, Beverly Macewicz, Richard Methot, Jean Michalski, Michael Prager, Paul Smith, Betsy Stevens, and Gail Theilacker.

22-28 - Dorothy Roll attended a Regional Data Base Administrator's meeting in Seattle, Washington.

28-31 - Izadore Barrett traveled to Houston, Texas, to attend the Mexico - U.S. Mexus-Gulf Meeting.

- David Mackett traveled to Washington, DC, to attend an NMFS Planners' Workshop.

Pacific Fisheries Environmental Group

September 3-6 - Dick Parrish traveled to La Jolla, California, to coordinate cooperative albacore research.

6 - Andy Bakun traveled to Seattle, Washington, to attend an International Recruitment in the Sub-Arctic meeting.

9-13 - Doug McLain traveled to Seattle, Washington, to attend an Integrated Global Ocean Station System meeting and to give a presentation.

23-27 - Rosemary Troian attended a class on small purchasing and contracts given by General Services Administration in San Francisco, California.

October 9-11 - Doug McLain traveled to Lake Arrowhead to an Eastern Pacific Oceanic Conference meeting. He presented a paper entitled "Cooperative Oceanographic Observations Program."

16 - Andy Bakun, Jerry Norton, and Dick Parrish traveled to Tiburon to attend a groundfish research coordination meeting. Doug McLain also attended to discuss possible Monterey National Ocean Service data support.

Tiburon Laboratory

September 4-7 - Ed Ueber traveled to Newport, Oregon, to chair the second Groundfish Alternative Management meeting, which delineated options for the final draft of alternative groundfish management proposals.

17-18 - Norman Abramson attended a meeting of the Pacific Coast Fisheries Data Committee and the Pacific Fishery Management Council's Scientific and Statistical Committee in Portland, Oregon.

24 - Ed Ueber met with Connie Ryan, Sea Grant Marine Advisor, to discuss the gillnet study.

October 1 - Norman Abramson and Jeannette Whipple traveled to the Bodega Marine Laboratory to meet with Izadore Barrett (SWFC), Floyd Anders (NMFS, Southwest Region), and Wally Clark and Paul Siri (Bodega Marine Laboratory) to discuss relocating Tiburon research activities at Bodega Bay.

2 - Jeannette Whipple, Mickey Eldridge, and Bruce MacFarlane, met with Joe Cech, University of California, Davis, and Wally Clark, Bodega Marine Laboratory, to discuss a cooperative proposal to Sea Grant.

2-5 - Ed Ueber traveled to Newport, Oregon, to attend the Western Association for Valuation of Ecosystems meeting and to speak on economic reasons for fisheries management at the Oregon Department of Fish and Wildlife and Oregon State University.

8-9 - Ed Ueber attended a Marine Sanctuaries meeting in Monterey, California, to review methods of economic assessment of the oil spill from the the tanker vessel Puerto Rican.

8-10 - Bill Lenarz attended a Groundfish Management Team meeting in Portland, Oregon.

14-17 - Sus Kato traveled to Portland, Oregon, to attend a conference ("Sharks: An inquiry into biology, behavior, fisheries and use") on October 14-15. He went on to Seattle, Washington, to attend Fish Expo on October 16, and to meet with personnel of the Utilization Division of the Northwest and Alaska Fisheries Center on October 17.

16-18 - Ed Ueber attended the NMFS conference on fisheries economics held in Rockport, Massachusetts. He also met with fishermen and processors in the Gloucester area.

PERSONNEL ACTIONS

Honolulu Laboratory

September 4 - David A. Somerton, Fishery Biologist - Full-Time Temporary Appointment.

6 - Theresa Villanueva, Biological Science Student Trainee - Leave Without Pay.

13 - Roy L. Bendell, Biological Technician (Fisheries) - Termination.

16 - Gaylene M. Shigeta, Data Transcriber - Full-Time Temporary Appointment.

21 - Linda A. Barraclough, Biological Aid - Conversion to Excepted Appointment.

24 - Robert E. Bourke, Biological Technician (Fisheries) - Extension of Temporary Appointment.

October 1 - Wesley K. Higuchi, Mathematics Aid - Conversion to Excepted Appointment.

7 - Linda D. Banish, Veterinary Medical Officer - Full-Time Temporary Appointment.

24 - Kathleen M. Repollo, Clerk-Typist - Conversion to Excepted Appointment.

27 - Austin K. Whiting, Data Transcriber - Part-Time Temporary Appointment.

28 - Wayde S. Higuchi, Computer Programmer - Extension of Temporary Appointment.

- Nathaniel T. Shippen, Computer Programmer - Extension of Temporary Appointment.

30 - Janet L. Pappas, Computer Programmer - Extension of Temporary Appointment.

La Jolla Laboratory

September 13 - Morgan Busby, Biological Technician - Resignation.

20 - Denise Fuhrman, Computer Assistant - Expiration of Appointment.

27 - James Payne, Computer Clerk - Resignation.

29 - Frances Begley, Secretary - Resignation.

30 - Sandra Hawes, Fishery Biologist - Expiration of Appointment.

- Laura Wing, Biological Aid - Expiration of Appointment.

- Laura Patla, Biological Technician - Termination of Appointment.

October 4 - Paul Sklar, Clerk - Expiration of Appointment.

11 - Frances Mann, Biological Aid - Expiration of Appointment.

24 - Catherine Dargan, Biological Technician - Entered on Duty.

Pacific Fisheries Environmental Group

September 17 - Doug McLain began a 90 day assignment to NOS. Doug will remain in his present office at PFEG until further notice.

19 - In a special ceremony, Andy Bakun presented Dave Husby with a cash award for sustained superior performance. Andy also presented Rosemary Troian with a cash award for special service.

Tiburon Laboratory

September 16 - Turley Wong, Statistician (FTP) - Entered on Duty.

24 - Elaine Mavrantonis, Data Transcriber - Entered on Duty.

30 - Rebecca Z. Hoff, Statistical Assistant - Resignation.

October 9 - Anne McBride, Biological Aid - Extension of Appointment.

31 - John Greeley, Editorial Assistant - Termination of Appointment.

TRAINING

Tiburon Laboratory

September 9-13 - William H. Lenarz, Supervisory Fishery Biologist - Supervision and Group Performance (OPM).

STATUS OF PUBLICATIONS

Published

Bakun, A. 1986. Comparative studies and the recruitment problem: searching for generalizations. Calif. Coop. Oceanic Fish. Invest. Rep. 26:30-40.

Balazs, G.H. 1985. Status and ecology of marine turtles at Johnston Atoll. Atoll Res. Bull. 285, 46 p.

Benville, P.E., Jr., J.A. Whipple, and M.B. Eldridge. 1985. Acute toxicity of seven alicyclic hexanes to striped bass, Morone saxatilis, and bay shrimp, Crangon franciscorum, in seawater. Calif. Fish and Game 71(3):132-140.

Gooding, R.M. 1985. Predation on released spiny lobster, Panulirus marginatus, during tests in the Northwestern Hawaiian Islands. Mar. Fish. Rev. 47(1):27-35.

Holland, K., R. Chang, and S. Ferguson. 1985. Progress report on tuna tracking. South Pac. Comm. Fish. Newsl. 32:19-23. March 1985. [No abstract.]

Johnson, P.A., and B.W. Johnson. 1984. Hawaiian monk seal observations on French Frigate Shoals, 1980. U.S. Dep. Commer., NOAA Tech. Memo. NMFS, NOAA-TM-NMFS-SWFC-50, 47 p.

A non-disturbance method of estimating Hawaiian monk seal populations, developed and tested previously on Laysan Island, was tested at French Frigate Shoals (FFS) during 1980. This Molt-Summation technique counts molting seals seen at 8-day intervals (the number of days seals normally take to molt) from May through November (the molting season). A total of 429 molting seals was counted on all islands except Shark and Disappearing, where molting seals could not be counted regularly. Adding the number of seals that could have molted on Shark and Disappearing Islands (extrapolated from the proportion of seals that used the two islands for haul-out) raises the estimate to 557 seals. Over 100 pups were born at FFS during 1980, resulting in a total population estimate of about 660 seals. The mean total atoll count during 1980 was 226 seals, suggesting only one-third of the population is normally ashore.

Although pups were born on eight islands within the atoll, over 90% were born on East, Round, and Whale-Skate. Both pupping and molt seasons were about 6 weeks later at FFS than at Kure or Laysan. The age structure of the FFS population was similar to Laysan, while the sex structure data suggested a nearly equal sex ratio, unlike other populations to the northwest where males may outnumber females 3:1. (A method is suggested for correcting the female bias inherent in counts made during the pupping season when only a part of the population is sexed.)

Laurs, R.M., R. Nishimoto, and J.A. Wetherall. 1985. Frequency of increment formation on sagittae of North Pacific albacore (Thunnus alalunga). Can. J. Fish. Aquat. Sci. 42:1552-1555.

An examination of sagittae from 116 albacore (Thunnus alalunga) caught in the North Pacific, injected with tetracycline, tagged, released and subsequently recaptured in sport and commercial fisheries showed that detectable increments are formed on these otoliths at an average rate of 0.954 per day. We take this as a confirmation of daily increment formation in North Pacific albacore sagittae. The slight departure of observed mean increment counts from the expected rate of one per day may be due to an occasional interruption of otolith growth, or to a systematic bias in detecting daily increments or interpreting otolith microstructure. The estimated rate of detectable increment formation applies explicitly to albacore of fork lengths between about 50 and 100 cm. If the same rate holds for fish smaller than 50 cm, as is likely, most albacore taken in sport or commercial catches can be aged accurately by applying our methods and expanding the increment count by 5%.

McLain, D.R., R.E. Brainard, and J.G. Norton. 1986. Anomalous warm events in eastern boundary current systems. Calif. Coop. Oceanic Fish. Invest. Rep. 26:51-64.

Perry, S.F., C. Daxboeck, B. Emmett, P.W. Hochachka, and R.W. Brill. 1985. Effects of exhausting exercise on acid-base regulation in skipjack tuna (Katsuwonus pelamis) blood. Physiol. Zool. 58:421-429.

The effects of exhausting exercise on acid-base balance of skipjack tuna blood were investigated. Following exercise, tuna displayed a mixed respiratory/metabolic acidosis with blood pH being reduced by ~ 0.4 units. The respiratory component (51% of the initial acidosis) was compensated following 20 min of recovery, while the blood metabolic acid load (H+m; ~ 8 mM) was cleared after only 50 min. At that time, there was a great discrepancy between blood lactate load and H+m load because blood lactate levels were still increasing. The significance of these results is discussed with reference to the tuna's habitat, behavior, and physiology.

Approved by Center Director

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